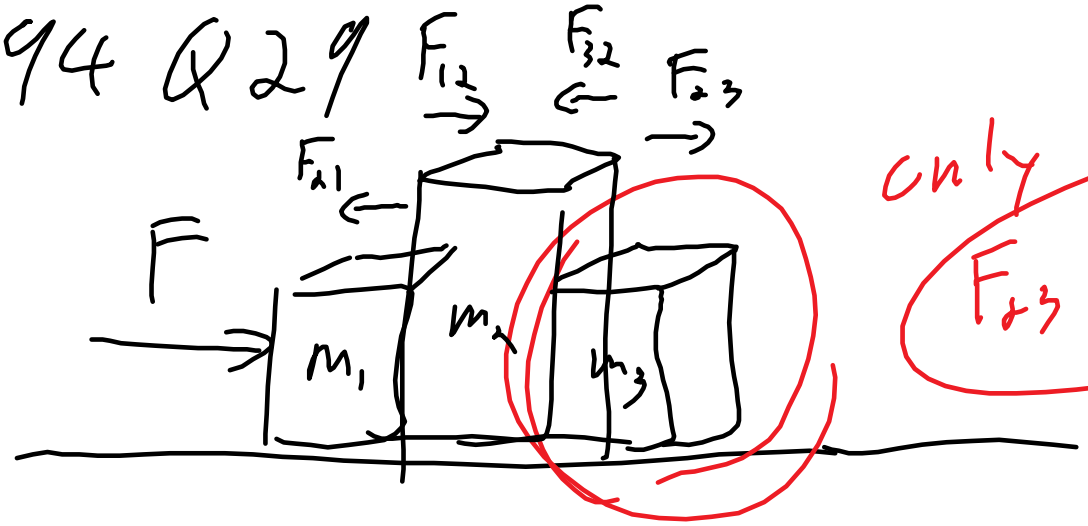
p94 Q29



only 1 Force

$F_{23} = F_{net_3}$

$F_{net} = ma = \sum F$ *

a) $a = \frac{F_{net}}{m_t} = \frac{F}{m_1 + m_2 + m_3}$

b) $F_{net_1} = m_1 a = \frac{m_1 F}{m_1 + m_2 + m_3}$

$F_{net_2} = \frac{m_2 F}{m_1 + m_2 + m_3}$

$F_{net_3} = \frac{m_3 F}{m_1 + m_2 + m_3}$

c) $F_{23} = F_{net_3} = \frac{m_3 F}{} = \frac{10(100)}{}$

$F_{13} = m_3 a = \frac{m_3 F}{m_1 + m_2 + m_3} = \frac{100N}{30}$

$F_{net} = \sum F$ opposite direction

$F_{net_2} = F_{12} \ominus F_{32}$

$F_{12} = F_{net_2} + F_{32}$

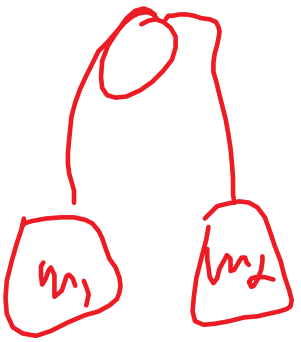
$F_{12} = \frac{m_2 F}{m_1 + m_2 + m_3} + \frac{m_3 F}{m_1 + m_2 + m_3}$

$F_{12} = \frac{(m_2 + m_3) F}{m_1 + m_2 + m_3} = \frac{20(100}{30}$

a) $3.3 m/s^3 = \frac{100N}{10+10+10 kg}$

b) $F_{net_1} = F_{net_2} = F_{net_3} = 10 \times 3.33\ldots$
ma
$= \boxed{33N}$

c) $F_{12} = 67N$ $F_{23} = 33N$



$F_{net} = (m_1 - m_2)g$

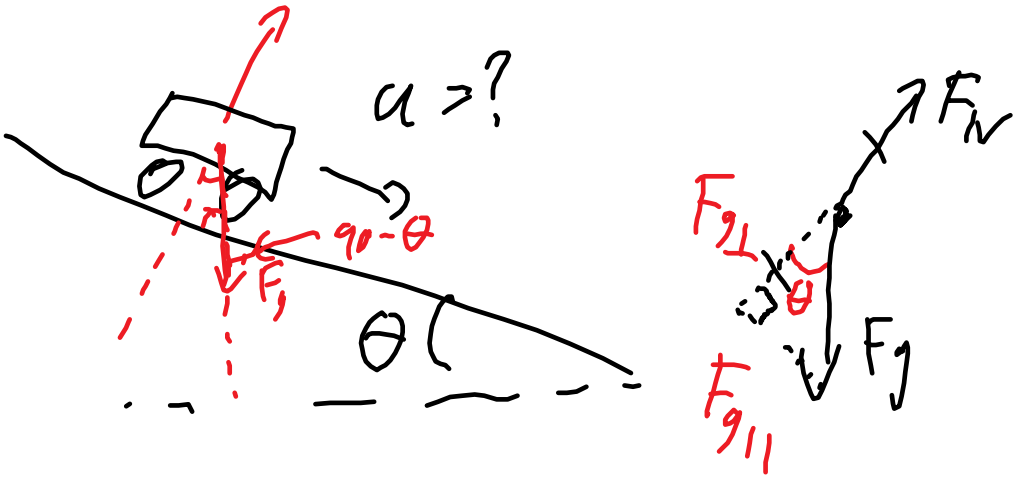
$a = \frac{(m_1 - m_2)g}{m_1 + m_2}$ F_{net}

Hand in projectile and freebody sheets - name and block on both

Slopes

What is the acceleration of an object without friction on a slope of a particular angle?

What is the force required to pull a block up/down that slope including friction?



F_a the component of the weight (force

$F_{g\perp}$ the component of the weight (force of gravity) perpendicular to the surface.

$$F_{g\perp} = F_g \cos\theta$$

$F_{g\parallel}$ is the parallel component of F_g.

$$F_{g\parallel} = F_g \sin\theta$$

$F_{g\perp} = F_N$ if there are no other forces or acceleration $\perp$ to slope

$$F_f = \mu F_N = \mu F_{g\perp} = \mu F_g \cos\theta$$

1. A 2.0 kg cart is rolling down a 30.0 degree

slope. determine

a) the weight of the cart
b) the component of the weight parallel to the surface
c) the acceleration of the cart if friction is negligible.

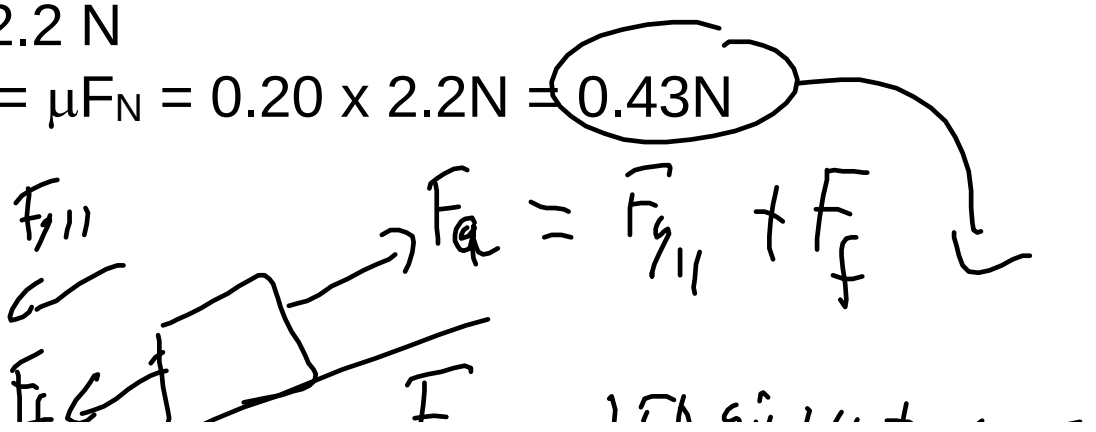
2. You pull a 2.5 N wooden block up the 30.0 degree incline.

a) what is the normal force of the block on the slope?
b) what is the force of friction if the coefficient is 0.20?
c) What is the force required to pull up the block?
d) how about pulling it down the slope?

3. You connect the block from question 2 over a pulley to a 300 g hanging mass, what is the acceleration of the system?

a) $F_g = mg = 2.0\ kg \times 9.8N/kg = 19.6\ N = 2.0 \times 10^1\ N$
b) $F_{g\ parallel} = F_g \sin\theta = 19.6\ N \sin 30 = 9.8N$
c) $a = Fnet/m = F_{g\ parallel}/m = 9.8N/2.0kg = 4.9m/s^2$

a) $F_N = F_{gperpedicular} = Fg \cos\theta = 2.5N \cos 30 = 2.2\ N$
b) $F_f = \mu F_N = 0.20 \times 2.2N = 0.43N$



F_f

$F_q = 2.5N \sin 20 + 0.43N$

$F_{q\perp} = 1.25N$

$\boxed{F_q = 1.7N}$

d) F_q $\rightarrow F_f = 0.43N$

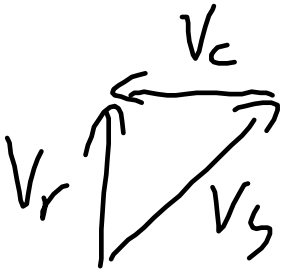
Quiz 1

a)

$V_{r_1} = \sqrt{V_s^2 + V_c^2}$

$\theta = \tan^{-1} \frac{V_c}{V_s}$

b)



E of N

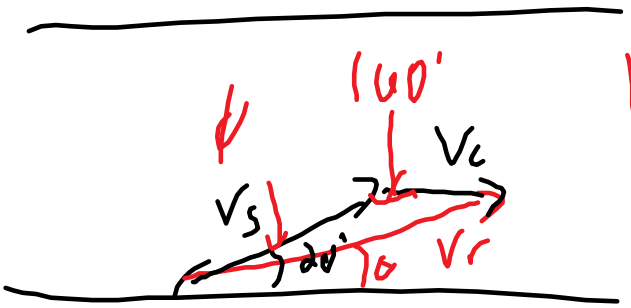
$V_{r_2} = \sqrt{V_c^2 - V_s^2}$

c) $t_1 = \frac{d_N}{V_N} = \frac{150m}{V_s}$ michael

$t_2 = \frac{150m}{V_c}$ Sandy

d) $d_E = V_c t$ ← Michael's time

e)

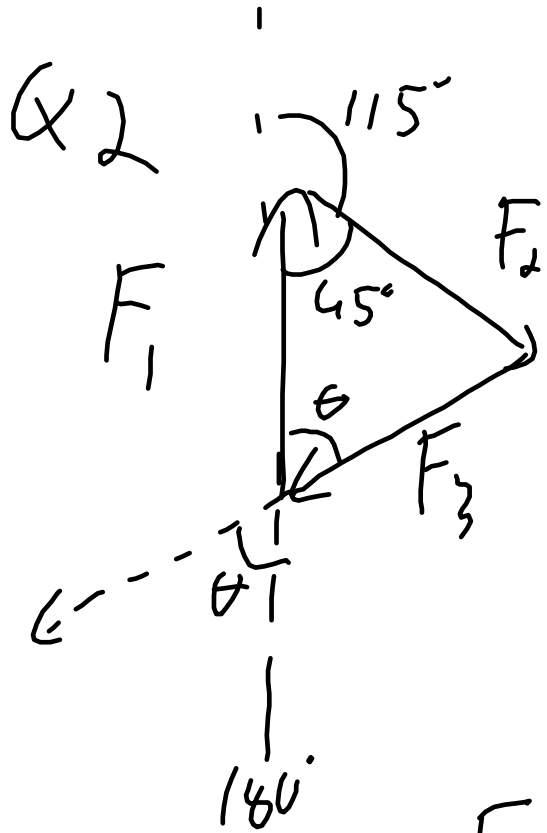


$V_r^2 = V_s^2 + V_c^2 - 2 V_s V_c \cos(160°)$

$\frac{\sin\phi}{V_c} = \frac{\sin 160°}{V_r}$

$20° - \phi = \theta$ ← to the shore

Q2

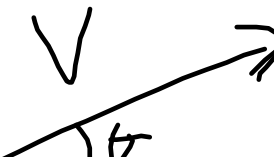


$F_3^2 = F_1^2 + F_2^2 - 2 F_1 F_2 \cos 65°$

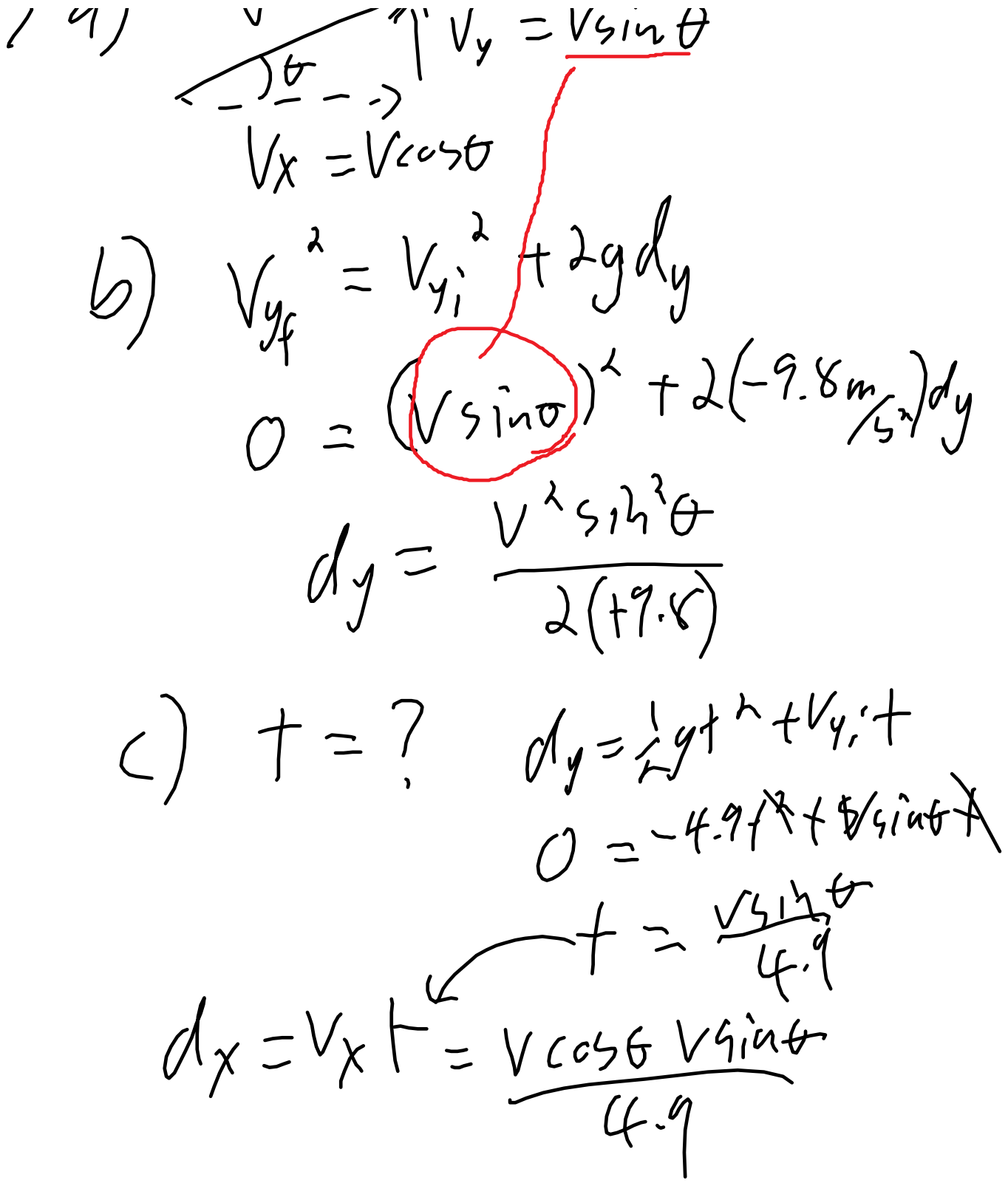
$\frac{\sin\theta}{F_2} = \frac{\sin 65°}{F_3}$

F_3 is $180° + \theta$

3 a)



$V_y = V \sin\theta$

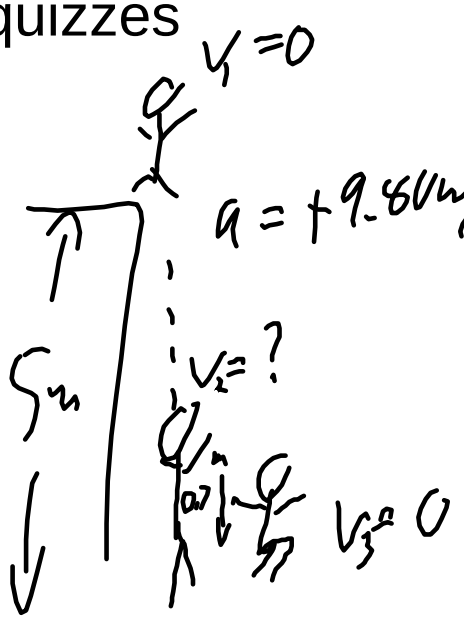


Block 2-3
Hand in projectile sim and free body worksheets
Go over dynamics questions
introduce slopes

hand back quizzes

pg 3

Q17



$$v_f^2 = v_i^2 + 2ad$$

$$v_f^2 = 0^2 + 2(98)(5)$$

$$v_f = \sqrt{98}$$

$$v_f = 9.899 m/s$$

$$F = ma$$

$$v_f^2 = v_i^2 + 2ad$$

$$0 = (9.899)^2 + 2(a)(0.7)$$

$$\frac{-98}{2(0.7)} = a = -70 m/s^2$$

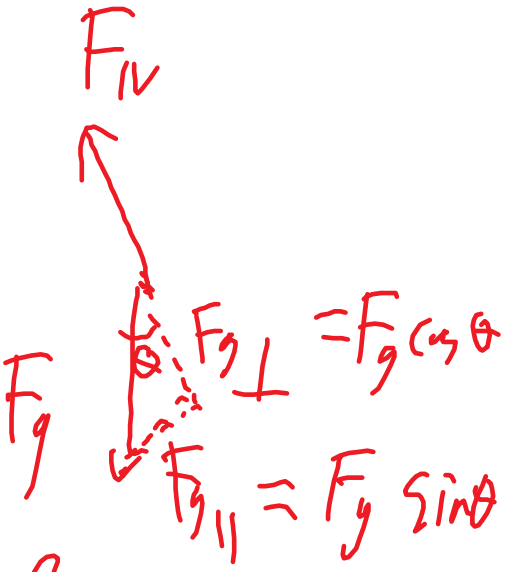
up

-70 up

$$F = -70 \times 50 = 3500 N \text{ up}$$

Slopes – frictionless

F_N F_{IN}



If there are no other forces or acceleration of the slope

the $F_N = F_{g_\perp} = F_g \cos\theta$

without friction

$F_{net} = ma = F_{g\parallel} = F_g \sin\theta$

friction, $F_f = \mu F_N$

$F_f = \mu F_g \cos\theta$